UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOLOGIC DESCRIPTION OF SELECTED STRONG-MOTION ACCELEROGRAPH SITES

PART V

by B. L. Silverstein

OPEN FILE REPORT
No. 80-1140

The report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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Preface

This is one in a series of reports that summarizes geologic and engineering data for selected strong-motion accelerograph stations in the western hemisphere.

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Introduction

This report is a summary of geologic and engineering data for strong-motion accelerograph sites. The data are taken from published and unpublished sources on file with the Seismic Engineering Branch, U.S. Geological Survey.

Where data are available from more than one source, the information given is the most complete or up-to-date; the coring date is included when available. The first page of the two-page summary for each site contains a brief narrative on local or site geology, a location map, and the station name, number, and coordinates as listed in Seismic Engineering Branch, 1977. When the first page describes more than one site, coordinates are listed on the bottom of the second page.

The second page contains a graphic representation of the geology and, where available, density (wet or dry) and P- and S-wave data. The lithologic symbols are taken from figure 1.

The log, in most cases, is taken from core samples at the site. Indication is given when the data is not directly at the site or when the geologic information is taken from sources other than cores (for example, a geologic cross section).

The term "postulated" indicates that a geologic core was not the source of information and that the rock sequence, thickness, and depth are postulated.

The code on the bottom of the second page is a geologic summary for use in a computer data bank. The reader is referred to Appendix II and Converse, 1978 for further information.

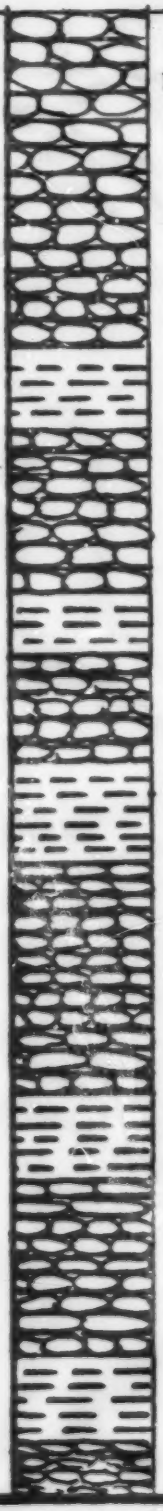
Station No. 1005 Station Berkeley, Byerly Seism. Sta.

Coordinates 37.87 N, 122.24 W

This station is located in the eastern section of the Santa Clara Valley. The valley proper is alluvial gravel, sand, silt, and clays. The Berkeley hills, which are between the Hayward and Calavaras faults, are Jurassic and Cretaceous sedimentary rocks of the Great Valley sequence, which are overlain by Tertiary sedimentary and Quaternary volcanic rocks. (Fumal, 1978)

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1005 Station Berkeley Byerly Seism. Sta.

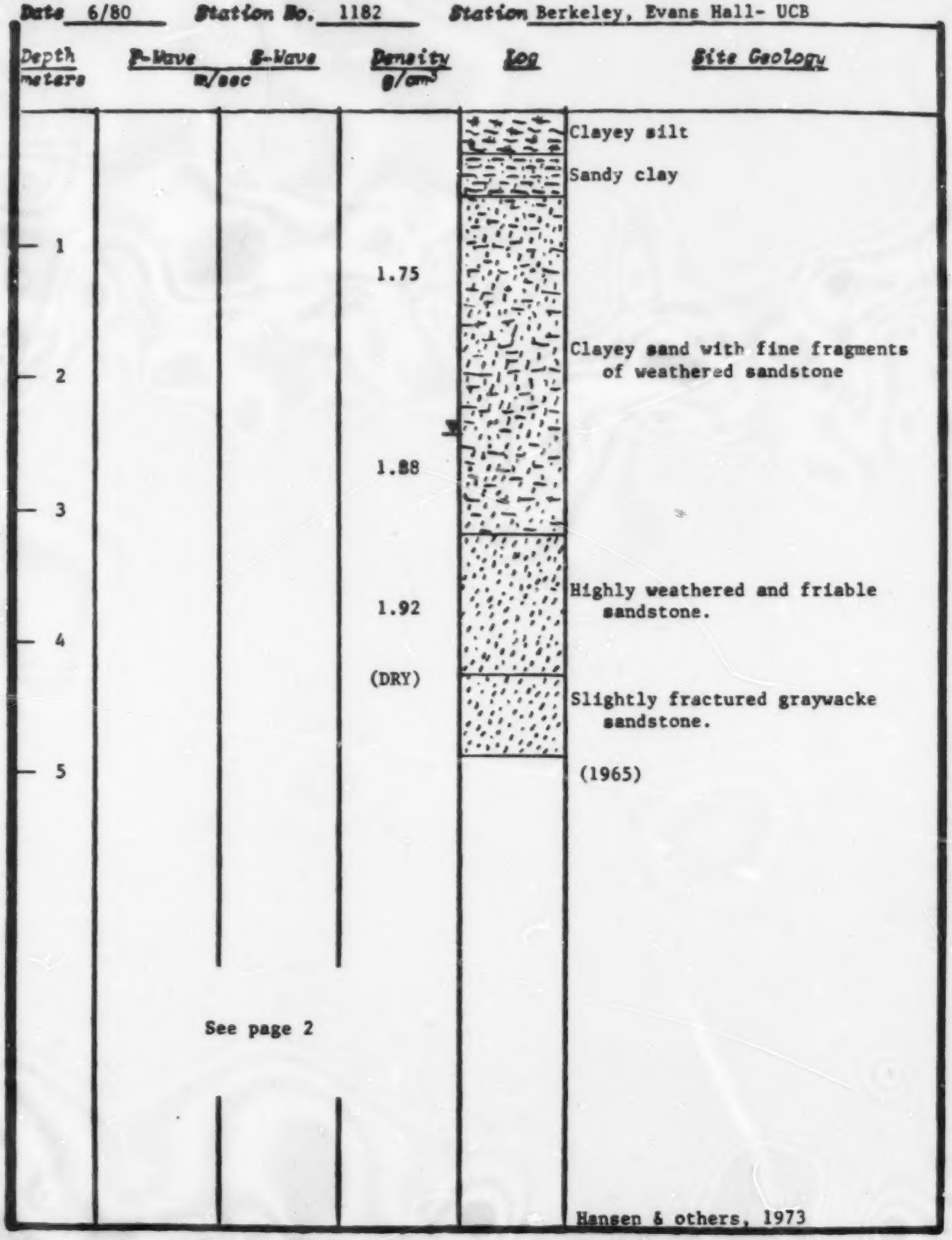
Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology
					Fractured and jointed chert interbedded with shale.

Hansen & others, 1973

CHF+SH

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1182 Station Berkeley, Evans Hall- UCB



See page 2

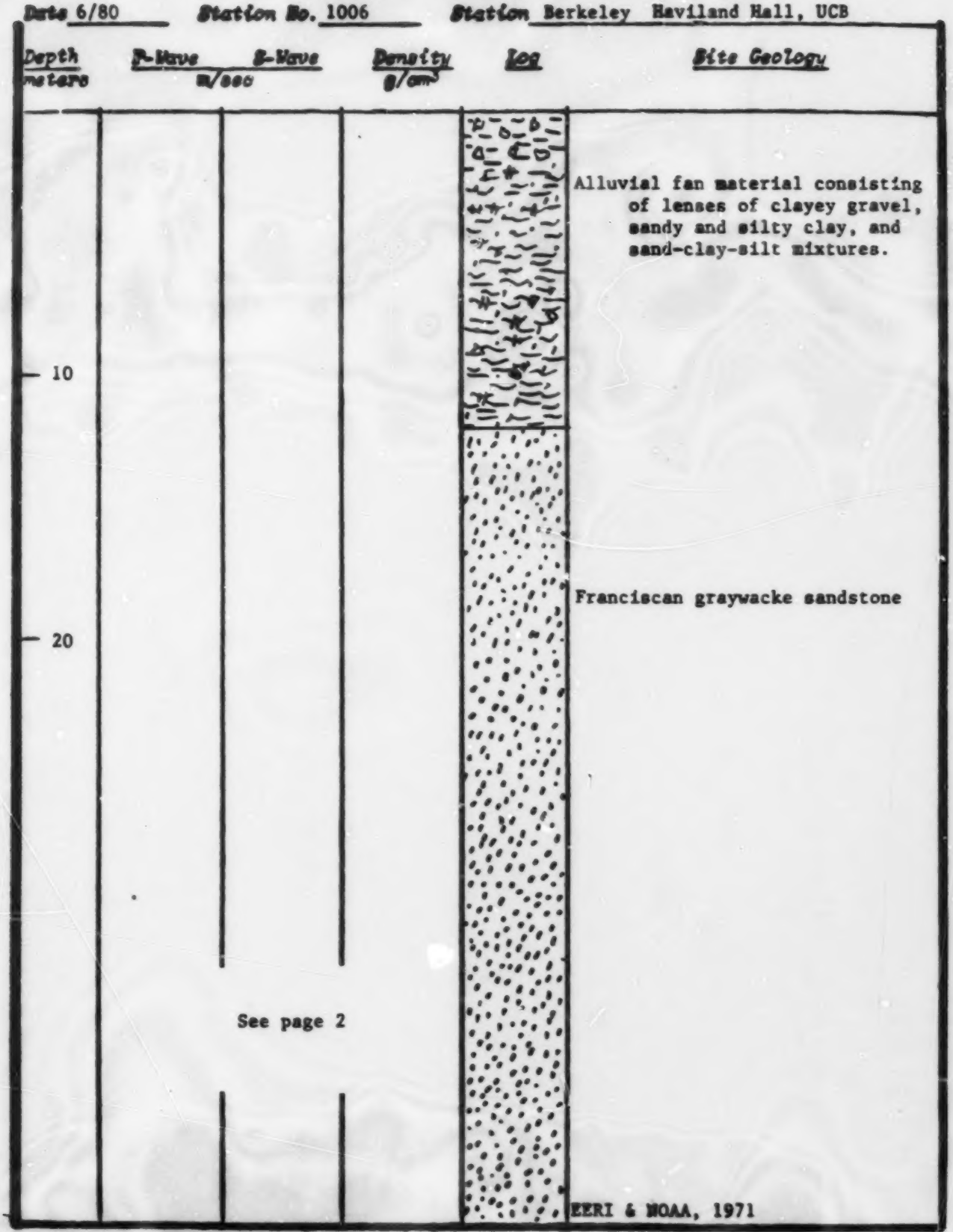
Hansen & others, 1973

Coordinates 37.87 N 122.26 W

MF3:SSW4:SS

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1006 Station Berkeley Haviland Hall, UCB

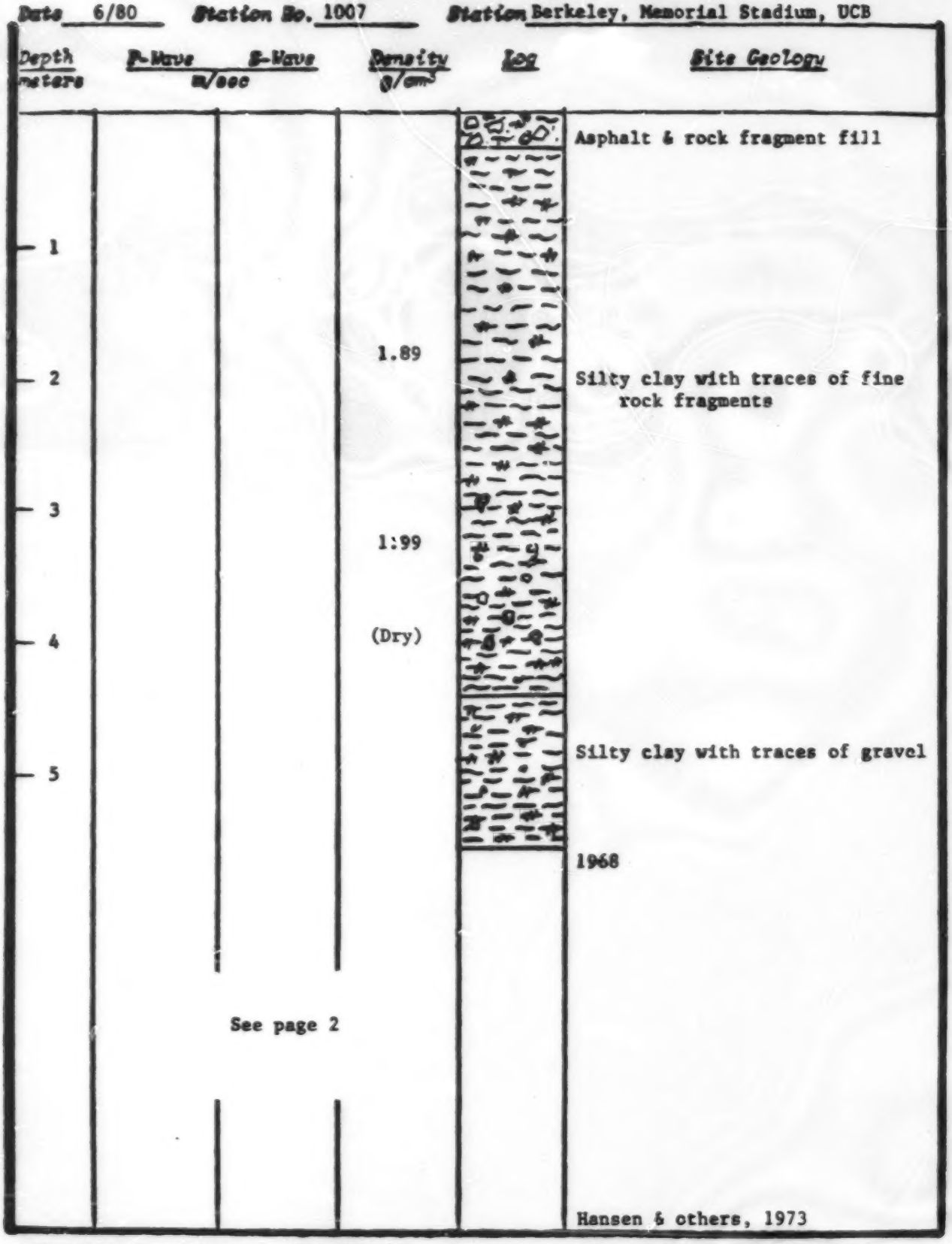


Coordinates 37.87 N 122.26 W

WF12:SS

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1007 Station Berkeley, Memorial Stadium, UCB



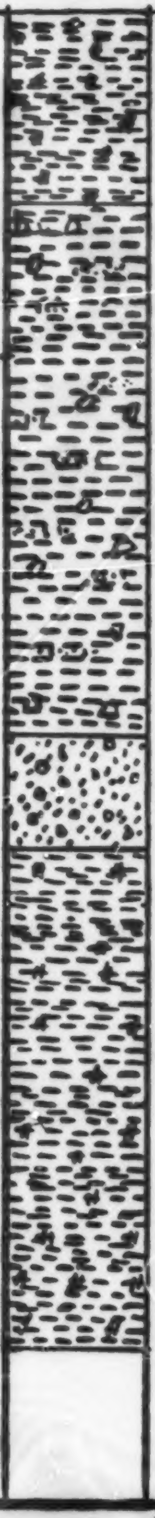
Coordinates 37.87 N 122.25W

CAF.2:NF5.5

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1181 Station Oakland 2730 Adeline Street

Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology
			1.54		Silty clay
			1.59		
			1.72		
			1.73		Clay with rock fragments and sand lenses
5					
					Sand and gravel
			1.73		Silty clay
	See page 2				
10			1.47 (DRY)		1965
					Hansen & others, 1973

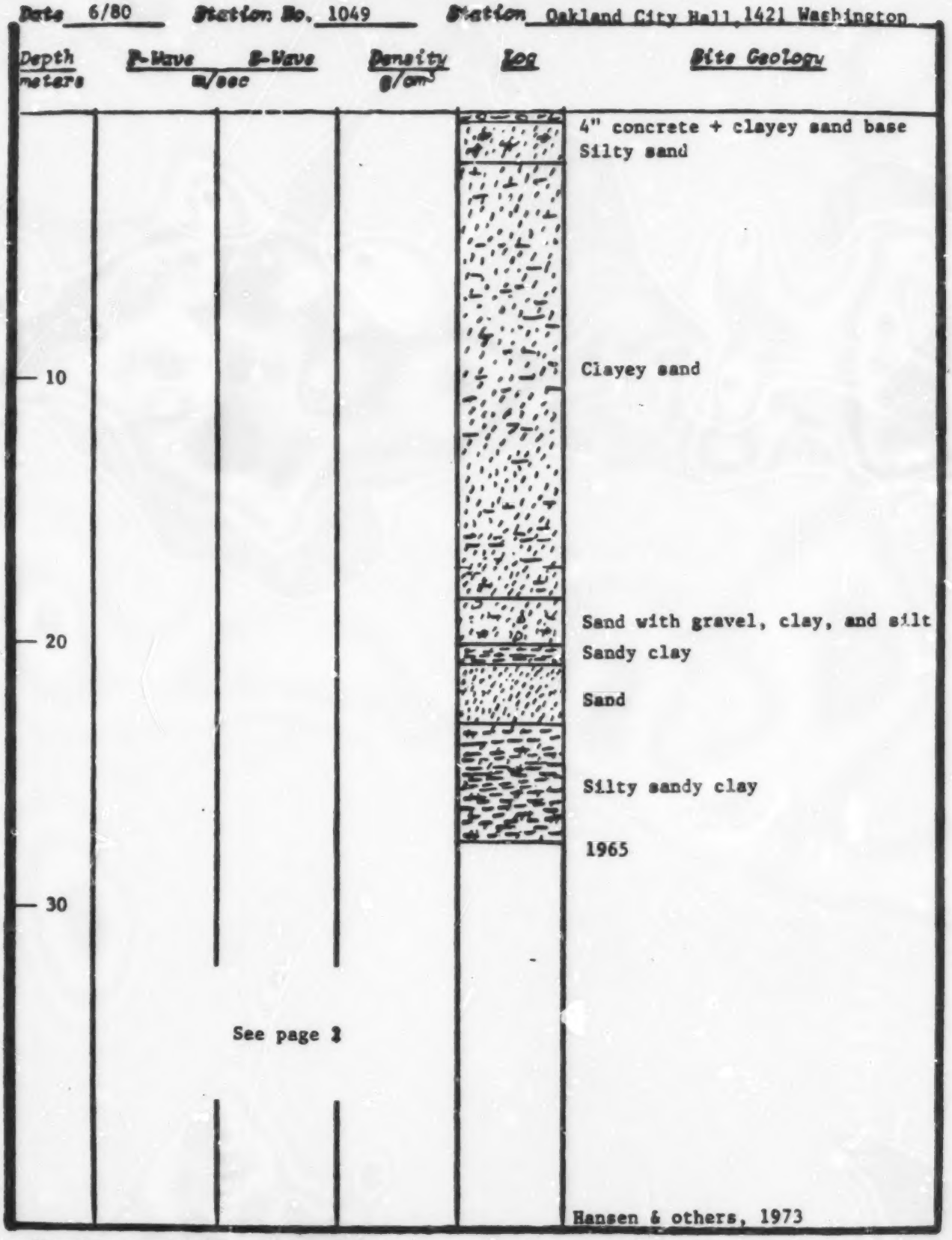


Coordinates 37.82 N 122.28 W

NF9

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1049 Station Oakland City Hall, 1421 Washington



See page 1

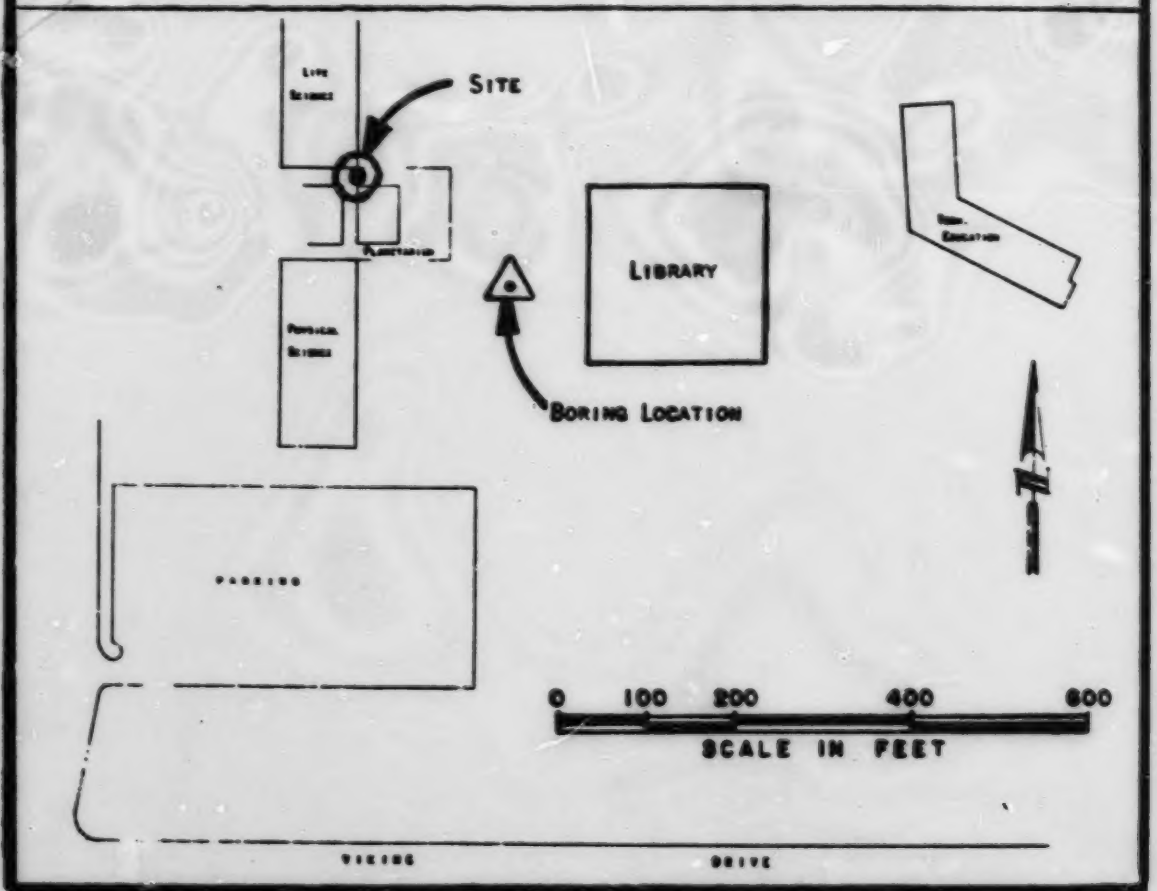
Coordinates 37.80 N 122.27 W

AF.3:NF28

Station No. 1057 Station Pleasant Hill Diablo Valley College

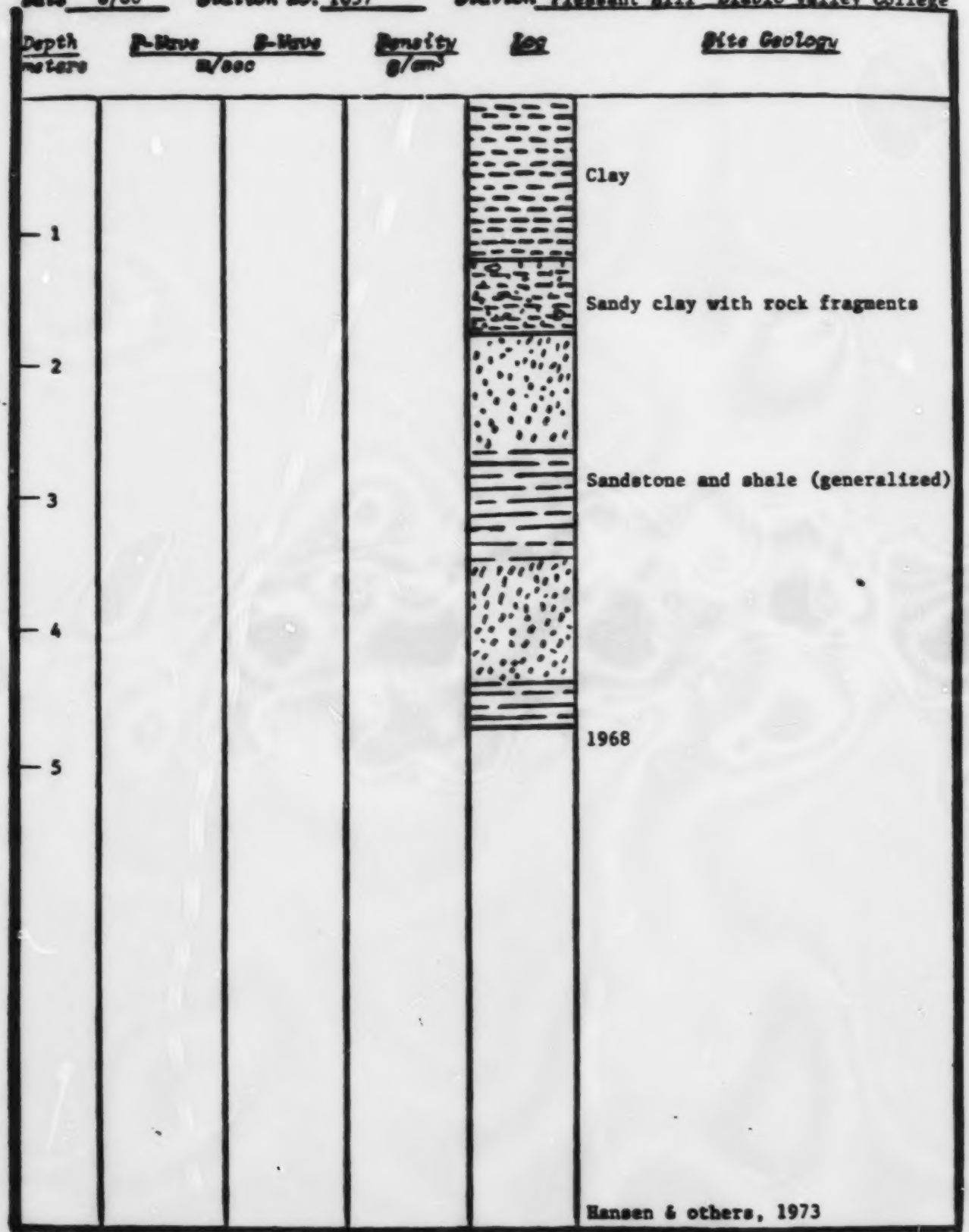
SITE DESCRIPTION

This station is located in the eastern section of the Santa Clara Valley. The valley proper is alluvial gravel, sand, silt, and clays. The Berkeley hills, which are between the Hayward and Calavaras faults, are Jurassic and Cretaceous sedimentary rocks of the Great Valley sequence, which are overlain by Tertiary sedimentary and Quaternary volcanic rocks. (Fumal, 1978)



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 Station No. 1057 Station Pleasant Hill Diablo Valley College



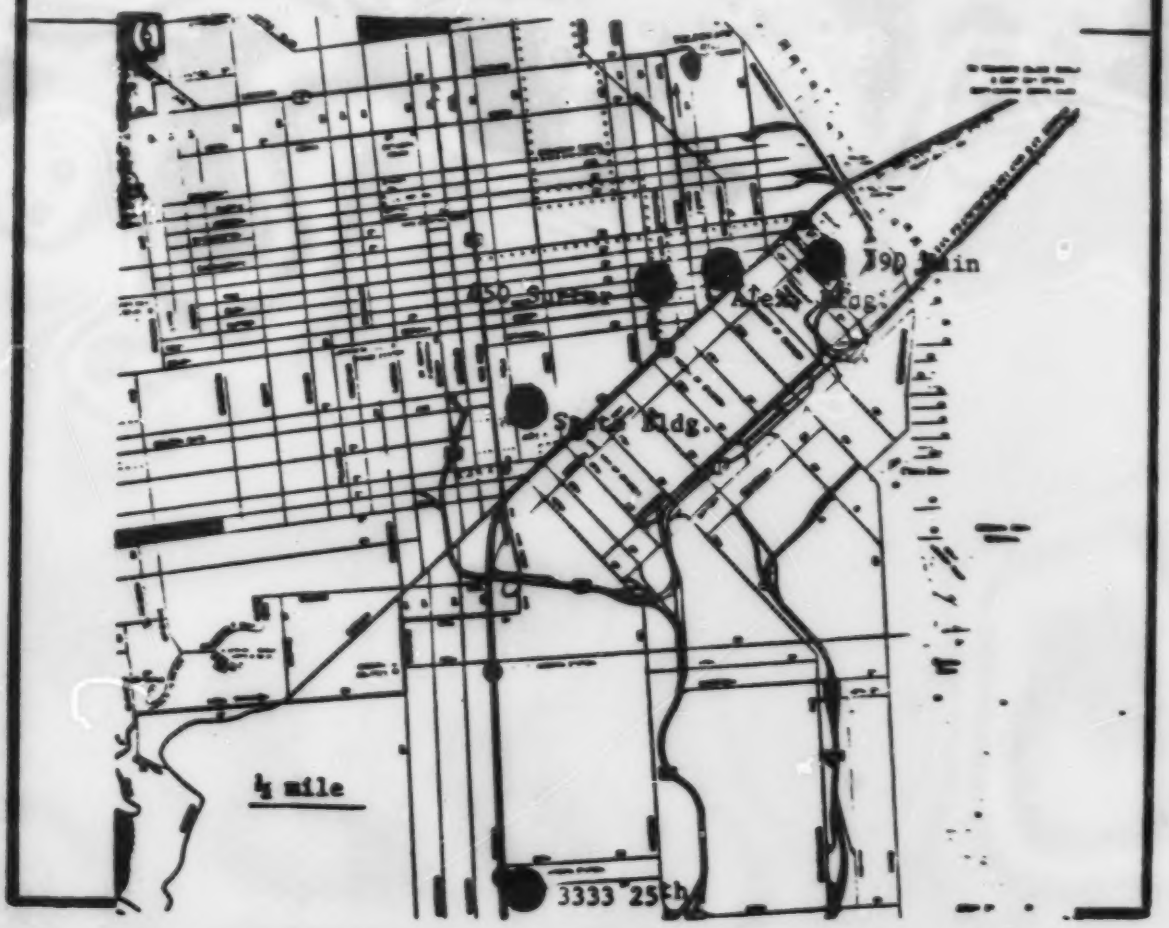
Coordinates 37.97 N 122.07 W

USGS OF1.75:SS+SE5

Station No. 1065 Station San Francisco, Alexander Bldg. 155 Montgomery

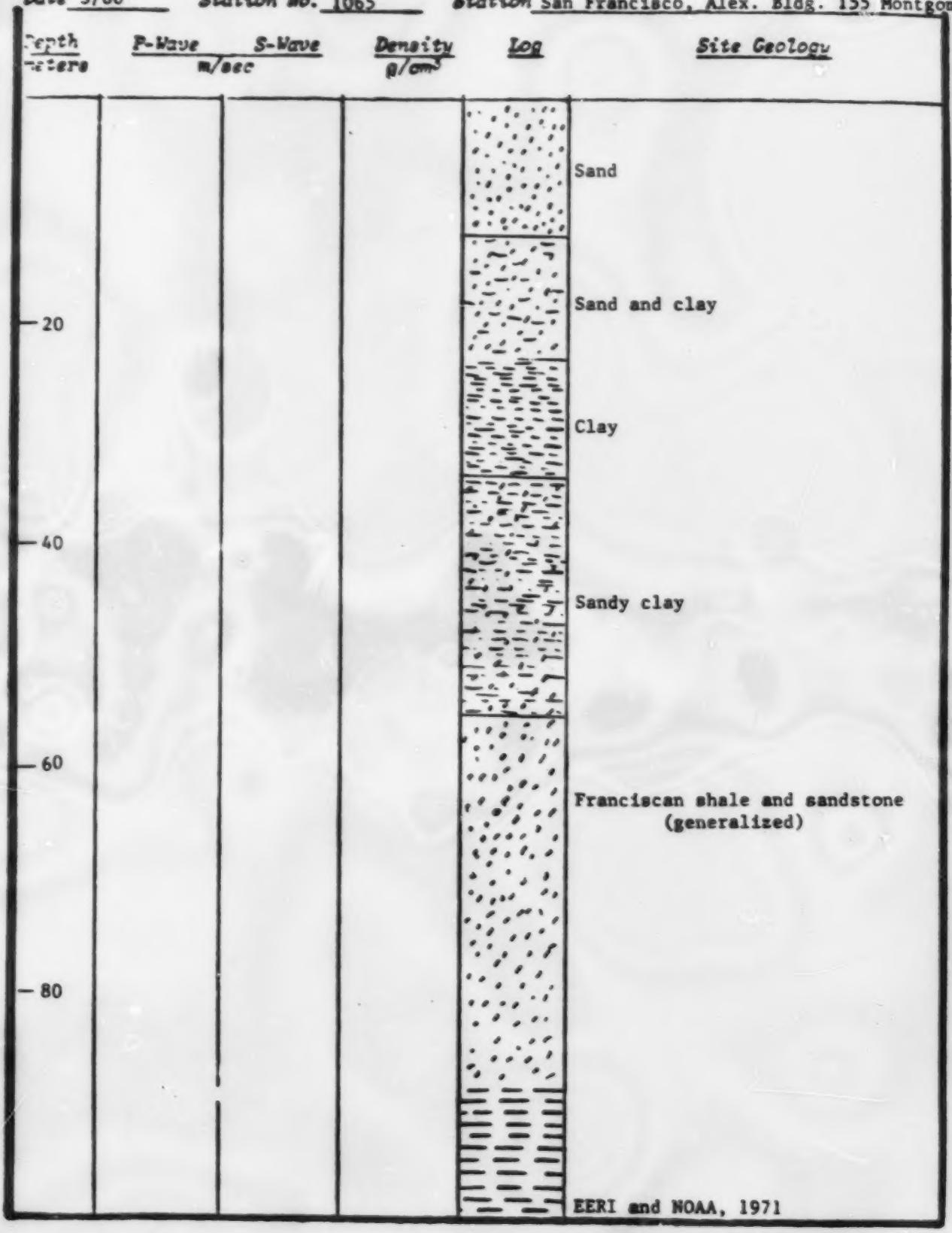
Coordinates 37.79 N, 122.40 W

The geology of the San Francisco North quadrangle consists of two distinct rock types: 1) the Jurassic to Cretaceous Franciscan assemblage, which is about 80% graywacke sandstone, 10% shale and siltstone, and 10% mafic volcanics, radiolarian chert, conglomerate, limestone, and glaucophane schist and 2) Quaternary eolian and alluvial deposits. (Schlocker, 1974)



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 3/80 Station No. 1065 Station San Francisco, Alex. Bldg. 155 Montgomery St

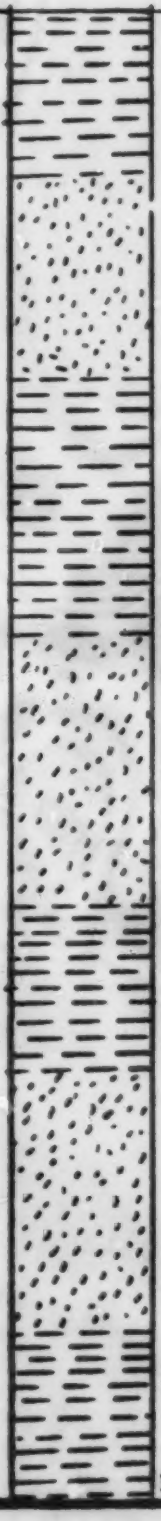


MF56:SS+SH

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 1/80 Station No. 1074 Station S.F. 390 Main St.

Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology



Deeply weathered and altered Franciscan shale & sandstone.

See page 12

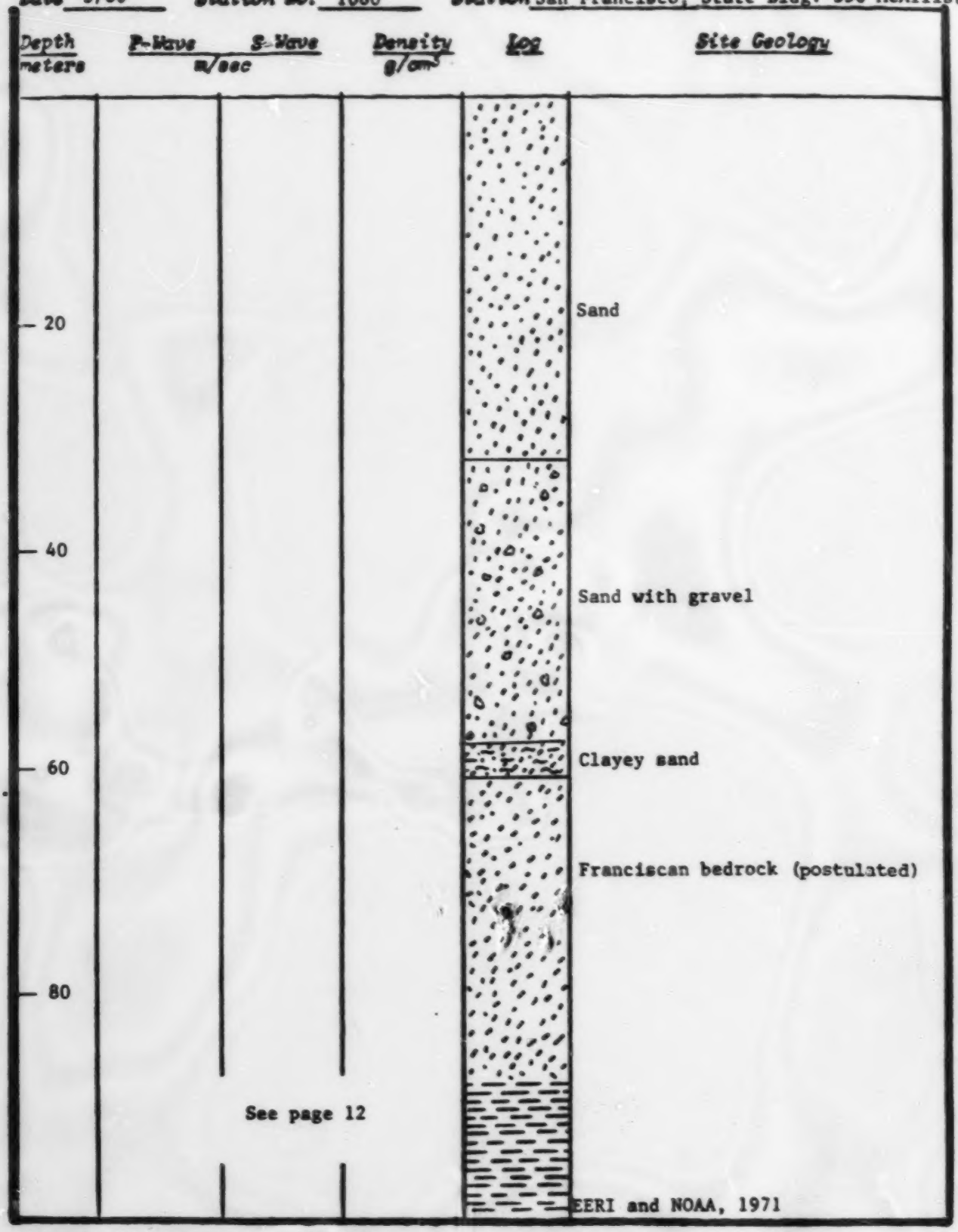
EERI and NOAA, 1971

Coordinates 37.79 N 122.39 W

SHW+SSW

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 3/80 **Station No.** 1080 **Station** San Francisco, State Bldg. 350 McAllister St



See page 12

Coordinates 37.78 N 122.42W

WP60:FR

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 1/80 Station No. 1114 Station S.F. 450 Sutter St

Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology
					Sand with some stones (loose)
					Sandy clay
5					Clayey sand with some gravel
					Silty and sandy clay with rock fragments. (decomposed shale)
10					Shale & sandstone with clay seams Fractured and partially decomposed.
					10/19/59

See page 12

Hansen and others, 1973

Coordinates 37.78 N 122.40 W

AF1.5:NS12:SHW+SSW

GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 1/80 Station No. 1220 Station S.F. 3333 25th St.

Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology
					Clay loam
					Sandy clay loam
10					Sand with small gravel
					Sandy clay loam with rock frag.
20					Sand
					Sandy clay loam
30					Sand
					12/12/46

See page 12

Hansen and others, 1973

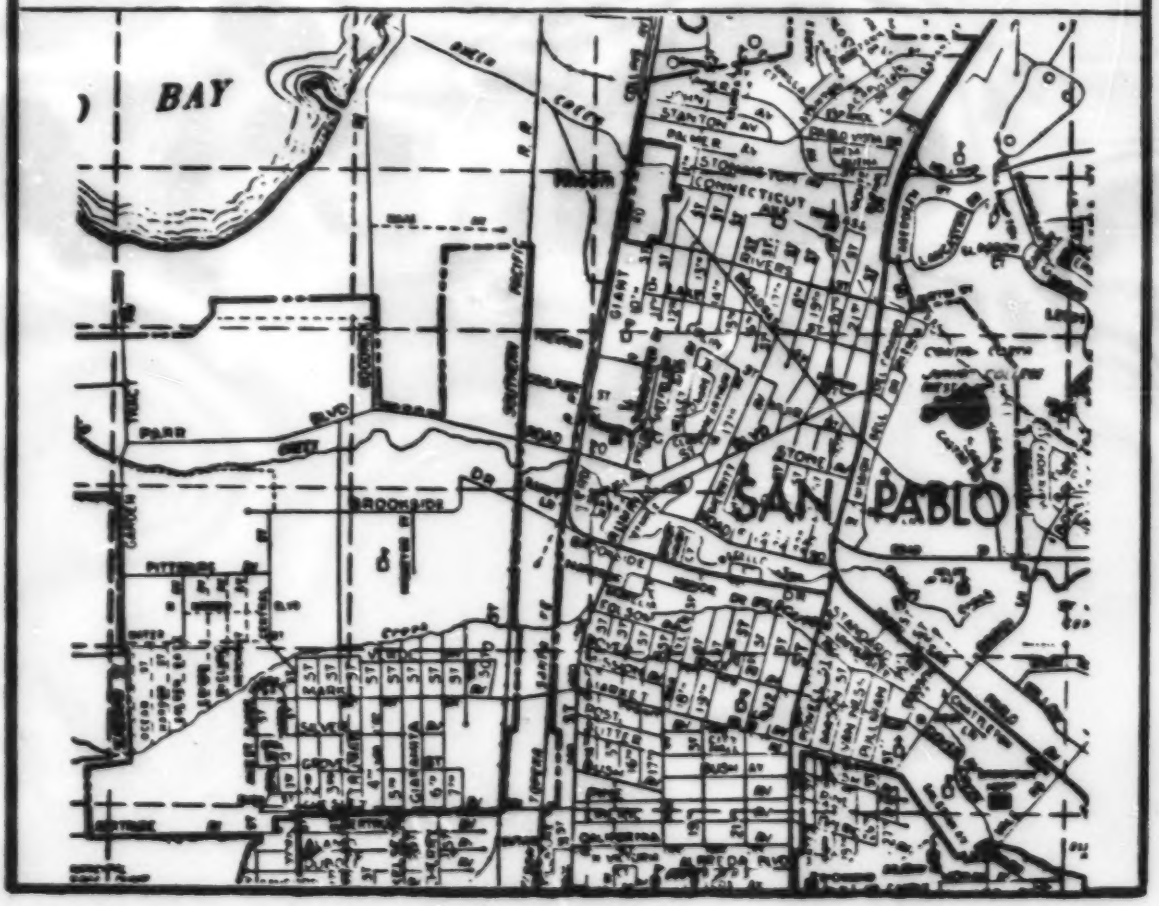
Coordinates 37.75 N 122.42 W

MP30

Station No. 1093 Station San Pablo Contra Costa Jr. College

SITE DESCRIPTION

This station is located in the eastern section of the Santa Clara Valley. The valley proper is alluvial gravel, sand, silt, and clays. The Berkeley hills, which are between the Hayward and Calavaras faults, are Jurassic and Cretaceous sedimentary rocks of the Great Valley sequence, which are overlain by Tertiary sedimentary and Quaternary volcanic rocks. (Fumal, 1978)



GEOLOGIC SUMMARY OF STRONG-MOTION SITES

Date 6/80 **Station No.** 1093 **Station** San Pablo Contra Costa Jr. College

Depth meters	P-Wave m/sec	S-Wave m/sec	Density g/cm³	Log	Site Geology
					Fill- Clayey sand & small gravel
			1.80		Sandy gravel
					Silty clay with organic material
2			1.39		Silty clay with fine sand
			1.28		Clayey silt and fine sand
4					
			1.44		
					Silty clay
6			1.49		
					1965

Hansen & others, 1973

Coordinates 37.98 N 122.34 W

AF1:NF7

References

Converse, April, 1978, Strong-Motion Information Retrieval System User's Manual: U.S.G.S. Open-File Report No. 79-289.

E.E.R.I. and N.O.A.A., 1971, Study of Strong-Motion Instrument Locations in Northern California, E.E.R.I., 2620 Telegraph Avenue, Berkeley, California.

Fumal, Thomas E., 1978, Correlations Between Seismic Wave Velocities and Physical Properties of Geologic Materials, San Francisco Bay Region, California: Open-File Report 78-1067.

Hansen, W. R., Weiss, R. B., Idress, I. M., and Cluff, L. S., 1973, Geotechnical Data Compilation for Selected Strong-Motion Sites in California: Woodward-Lundgren Associates, Oakland, California.

Seismic Engineering Branch, 1976, Western Hemisphere Strong-Motion Accelerograph Station List, 1976: U.S.Geological Survey Open-File Report No. 77-374.

Appendix A

Combined Index of Parts I - V

Station No	State	Instrument Site	Part	Page
2305	Arizona	Phoenix V.A. Hospital	I	3
1001	California	APEEL Array Sta. 1	III	6
1002/1194	"	" " " 2 & 2A	III	8
1003	"	" " " 6	III	10
1161	"	" " " 9	III	12
1007	"	" " " 10	III	14
1180	"	" " " 1E	III	16
1121	"	" " " 2E	III	18
1219	"	" " " 3E	III	20
1005	"	Berkeley, Byerly Seismic Station	V	2
1182	"	Berkeley, Evans Hall--UCB	V	4
1006	"	Berkeley, Haviland Hall--UCB	V	5
1007	"	Berkeley, Memorial Stadium--UCB	V	6
1008	"	Bishop	II	3
1120	"	Buena Vista Pumping Plant	II	5
1013-16	"	Cholame-Shandon Stations	II	7
5028	"	El Centro Sta. 7	IV	2
5117	"	El Centro Sta. 9	IV	4
5412	"	El Centro Sta. 10	IV	5
5165	"	El Centro, Differential Array	IV	6
1023	"	Ferndale, Old City Hall	I	7
1024	"	Foster City, Audobon School	III	24
1188	"	Fremont, 3909 Stevenson	III	26

1229	California	Fresno V.A. Hospital	II	12
1028	"	Hollister City Hall	III	28
638	"	Los Angeles V.A. Hosp., Brentwood	I	9
1222	"	Menlo Park, 1330 University Drive	II	14
1215	"	Mt. Diablo Summit Building	II	16
1046	"	Newville, Flood Farm	II	18
1181	"	Oakland, 2730 Adeline	V	7
1049	"	Oakland City Hall, 1421 Washington	V	8
1140	"	Oroville Dam	I	11
1051	"	Oroville, Seismograph Station	I	13
1191/1212	"	Palo Alto Sq. Nos. 1 and 2	III	28
1054	"	Pine Flat Dam	II	20
1057	"	Pleasant Hill, Diablo Valley College	V	10
639	"	San Diego V.A. Hospital	II	22
1065	"	San Francisco, Alexander Building	V	12
1068	"	San Francisco, B of A	IV	7
1136	"	San Francisco, BART Vent Shaft	IV	9
1071	"	San Francisco, Beth. Pac. Bldg.	IV	10
1118	"	San Francisco, Eastman Kodak	IV	11
1073	"	San Francisco, Federal Bldg.	IV	12
1127	"	San Francisco, Firemen's Fund	IV	13
1117	"	San Francisco, Golden Gate Park	I	15
1067	"	San Francisco, 390 Main Street	V	14
1168	"	San Francisco, Pac. T & T	IV	14
1228	"	San Francisco, Randall Museum	I	17
1115	"	San Francisco, Shell Bldg.	IV	15

1080	California	San Francisco, State Building	V	15
1114	"	San Francisco, 450 Sutter St.	V	16
1220	"	San Francisco, 3333 25th St.	V	17
1093	"	San Francisco, V.A. Hospital	V	18
1225	"	San Pablo, Contra Costa Jr. Coll.	I	19
1098	"	Terminus Dam	II	24
2201	Montana	Butte, Metallurgy Building	I	21
2008	Nevada	Reno, V.A. Hospital	I	23
2605	New York	Albany, V.A. Hospital	I	25
2206	Utah	Flaming Gorge, Seismograph Station	I	27
2203	"	Logan, Admin. Bldg., USU	I	29
2210	"	Salt Lake City, V.A. Hospital	I	31
2130	Washington	American Lake V.A. Hospital	II	26
2101	"	Olympia, Highway Test Laboratory	I	33
2102	"	Seattle Federal Building	II	29
2106	"	Seattle, Pier 20	I	35
2124	"	Walla Walla, V.A. Hospital	II	31
3500	Managua, Nicaragua	Banco Central	IV	16
3501	" "	Esso Refinery	IV	18
3507	" "	Intercontinental Hotel	IV	19

APPENDIX B

Changes in the Geologic Code

The symbol AL has been replaced by NF (Natural Fill), AF (Artificial Fill), CN (Coarse Natural Fill), CA (Coarse Artificial Fill), and SO (Soil). Natural Fill (NF) is used to indicate any natural deposits without regard to origin while SO (Soil) is used when the log indicates the deposit as soil. A NF could be soil. The term coarse is used when there is a considerable amount of pebble or larger size particles in the deposit. UD (Unconsolidated Deposit) is used when there is no indication of the fill as natural or artificial.

Other changes in the code include the elimination of the class code and the deletion and the addition of other symbols (see table 1).

Appendix D contains the revised geologic codes of Volumes I-IV.

APPENDIX C

Explanation of Geologic Code

The symbols and their meanings are listed in table 1. Site lithology is indicated by groups of two-letter abbreviations (rock symbol), which may have a third letter (explanatory symbol) that describes a physical characteristic, for example SH is shale and SHF is fractured, sheared, or jointed shales.

A number after the rock type is the depth to the base of the unit, for example NF914 means natural fill to a depth of 914 meters. The colon indicates "overlying", for example NF914:US1067 means natural fill to 914 meters overlying undifferentiated sedimentary rocks that extend to a depth of 1067 meters. The letter K is a 1000 times multiplier, e.g. 4K means 4000 meters. The absence of a number means the depth of the material is not known. A standard geologic abbreviation is not used.

Appendix D

Revised geologic codes

Station No	State	Instrument Site	Revised code
2305	Arizona	Phoenix V.A. Hospital	UD122:GR
1001	California	APEEL Array Sta. 1	NF30
1002/1194	"	" " " 2 & 2A	NF30
1003	"	" " " 6	SO1:USW+6031
1161	"	" " " 9	NF30
1007	"	" " " 10	NF1:SSW7:SS30
1180	"	" " " 1E	NF30
1121	"	" " " 2E	NF30
1219	"	" " " 3E	NF3:GSW
1008	"	Bishop	NF167:TF200:NF
1120	"	Buena Vista Pumping Plant	UD
1013	"	Cholame-Shandon 2	NF84:SSU
1014	"	" " 5	UD
1015	"	" " 8	NF1.7K
1016	"	" " 12	NF30:SSU1.7K:AM
5028	"	El Centro Sta. 7	NF150
5117	"	El Centro Sta. 9	NF617
5412	"	El Centro Sta. 10	SO.3:NF5
5165	"	El Centro, Differential Array	NF35
1023	"	Ferndale, Old City Hall	NF60:US1.8K:US+FR
1024	"	Foster City, Audobon School	AF1:NF30
1188	"	Fremont, 3909 Stevenson	NF30
1229	"	Fresno V.A. Hospital	NF1.2K:UB

1028	"	Hollister City Hall	NF13
638	"	Los Angeles V. A. Hospital, Brentwood	NF914:US1067:SL
1222	"	Menlo Park, 1330 University Drive	UD
1215	"	Mt. Diablo Summit Building	UB
1046	"	Newville, Flood Farm	US
1140	"	Oroville Dam	SC
1051	"	Oroville, Seismograph Station	SC
1191/1212	"	Palo Alto Sq. Nos. 1 and 2	NF30
1054	"	Pine Flat Dam	CF1:AM
639	"	San Diego V.A. Hospital	AF.3:NFI:SS16
1068	"	San Francisco, B of A	AF1:NF33:SHF+SSF46
1136	"	San Francisco, BART Vent Shaft	NF43
1071	"	San Francisco, Beth. Pac. Bldg.	AF5:NF30
1118	"	San Francisco, Eastman Kodak	AF12:NF32:SH+SS
1073	"	San Francisco, Federal Bldg.	NF38
1127	"	San Francisco, Firemen's Fund	NF4:SHF+SSF7
1117	"	San Francisco, Golden Gate Park	CH+SH
1168	"	San Francisco, Pac. T & T	UD5:SH+SS13
1228	"	San Francisco, Randall Museum	CH+SS
1115	"	San Francisco, Shell Bldg.	UD40
1225	"	San Francisco, V.A. Hospital	UBF
1098	"	Terminus Dam	UM+DK
2201	Montana	Butte, Metallurgy Building	DK+QMF
2008	Nevada	Reno, V.A. Hospital	SOV:NFI:CW2:NF1.2K:UV+
2605	New York	Albany, V.A. Hospital	NF27:SHF2.4K:UB
2206	Utah	Flaming Gorge, Seismograph Station	US

2203	"	Logan, Admin. Bldg., USU	UD
2210	"	Salt Lake City, V.A. Hospital	NF84:US
2130	Washington	American Lake V.A. Hospital	SOV:NF340
2101	"	Olympia, Highway Test Laboratory	AF3:NF160
2102	"	Seattle Federal Building	AF3:NF39
2106	"	Seattle, Pier 20	UD38
2124	"	Walla Walla, V.A. Hospital	NF183:BA
3500	Managua, Nicaragua	Banco Central	UD1:TF7:UD22
3501	" "	Esso Refinery	NF23
3507	" "	Intercontinental Hotel	NF2:SS20

TABLE 1

ALPHABETIZED GEOLOGIC CODE

ROCK SYMBOLS

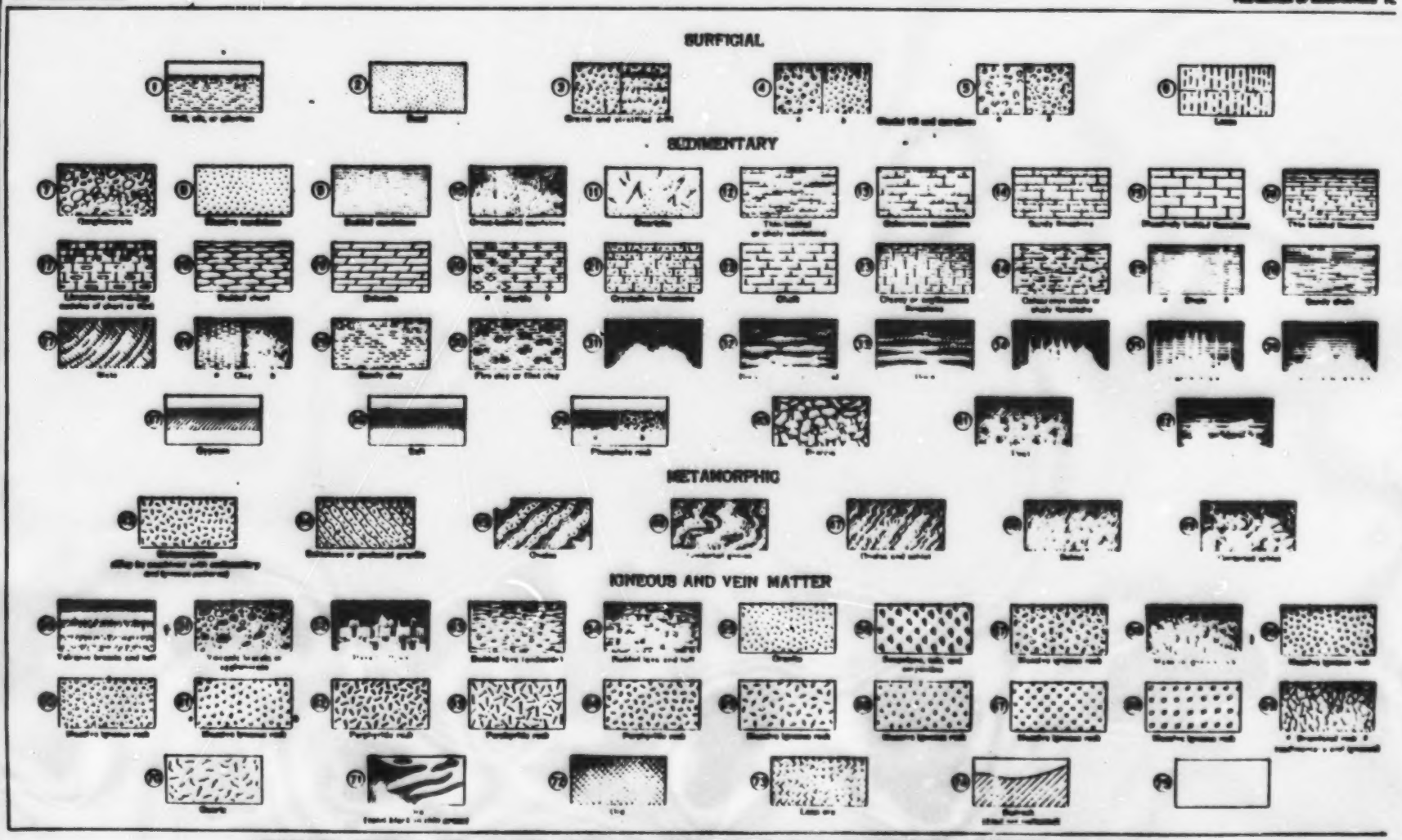
AF	Artificial Fill
AG	Agglomerate
AM	Amphibolite
AN	Andesite
BA	Basalt
BR	Breccia
CA	Coarse Artificial Fill
CG	Conglomerate
CH	Chert
CN	Coarse Natural Fill
CY	Claystone
DI	Diorite
DK	Dikes of Sills
DO	Dolomite
FR	Franciscan Rocks
GB	Gabbro
GD	Granodiorite
GN	Gneiss
GO	Gouge
GR	Granite
GS	Greenstone
HF	Hornsfel
LF	Lava Flows
LS	Limestone
MR	Marble
MS	Mudstone
MZ	Monsonite
NF	Natural Fill
PH	Pnyllite
QM	Quartz Monzonite
QZ	Quartzite
RY	Rhyolite
SC	Schist
SH	Shale
SI	Siltstone
SL	Slate
SO	Soil
SP	Serpentinite
SS	Sandstone
SY	Syenite
TF	Tuff
UB	Undifferentiated Basement
UD	Unconsolidated Deposits
UI	Undifferentiated Igneous Rocks
UM	Undifferentiated Metamorphic Rocks
UP	Unconsolidated Pyroclastic Rocks
US	Undifferentiated Sedimentary Rocks
VA	Volcanic Ash
VG	Volcanic Glass
XB	Crystalline Basement

DESCRIPTIVE SYMBOLS

C	Consolidated
D	Deep
F	Fractured, Sheared, or Jointed
I	Interbedded
L	Layered or Stratified
M	Massive
P	Permafrost
S	Semiconsolidated
U	Unconsolidated
V	Veneer
W	Weathered or Friable

Other Symbols

:	Overlying
+	And
.	Decimal
K	x1000 (multiplier)



LITHOLOGIC SYMBOLS USED IN STRUCTURE AND COLUMNAR SECTIONS TO REPRESENT DIFFERENT KINDS OF ROCK

Figure 1